

Spot Safety Project Evaluation

Project Log # 200606160

Spot Safety Project # 03-99-204

**Spot Safety Project Evaluation of the Offset Left Turn Lane Installation
At the Intersection of US 421 (Carolina Beach Rd) and SR 1576 (River Rd) / SR 1531 (Seabreeze Rd)
New Hanover County**

Documents Prepared By:

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Principal Investigator

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Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

The Intersection of US 421 (Carolina Beach Rd) and SR 1576 (River Rd) / SR 1531 (Seabreeze Rd)
New Hanover County

Project Information

The project improvement countermeasure chosen for the subject location was to positively offset the median left turn lanes on US 421. US 421 is a four-lane divided facility with a wide grass median. US 421 is a major arterial in this area, providing access between the southern New Hanover County beaches and Wilmington. The intersection is controlled by stop signs on River Rd and Seabreeze Rd. The current speed limits are 55 mph on River Rd and Seabreeze Rd and 45 mph on US 421 within the vicinity of the intersection.

The initial crash analysis for this location was completed from January 1, 1996 through December 31, 1998 with a total of 19 reported crashes. According to the initial crash analysis, there were nine Left Turn-Same Roadway crashes deemed correctable by the project, resulting in three class-A, four class-B, and seven class-C injuries.

According to the Project Justification Sheet, a pattern of Left Turn-Same Roadway crashes emerged due to the limited sight distance provided for US 421 motorists attempting left turns while left turning motorists were queued in the opposing left turn lane. The improvement was intended to mitigate the pattern of Left Turn type accidents while preparing the intersection for more efficient signal phasing should a signal ever be installed. The project was completed on August 1, 2002 at an estimated cost of \$100,000.

Naïve Before and After Analysis

After reviewing all of the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from June 1, 2002 through September 30, 2002. The before period consisted of reported crashes from November 1, 1998 through May 31, 2002 (3 Years, 7 Months) and the after period consisted of reported crashes from October 1, 2002 through April 30, 2006 (3 Years, 7 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. Please see attached *Location Map* for further detail. The following tables depict the Naïve Before and After Analysis for the Total Crashes and Target Crashes at the treatment location. Please note that the Target Crashes for the applied countermeasure were Left Turn-Same Roadway (LTSR) Crashes on US 421.

<u>Total Treatment Information</u>	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	24	12	- 50.0%
Total Severity Index	9.40	2.85	- 69.7%
Target Crashes	14	3	- 78.6%
Target Severity Index	12.23	3.47	- 71.6%
Volume	26,900	30,800	14.5%

<u>Target Crash Information</u>	Before	After	Percent Reduction (-)/ Percent Increase (+)
Fatal Injury Crashes	0	0	N/A
Non-Fatal Injury Crashes	12	1	- 91.7%
Total Injury Crashes	12	1	- 91.7%
Night Crashes	5	1	- 80.0%
Wet Crashes	1	1	0.0%

The naïve before and after analysis at the treatment location resulted in a 50 percent decrease in Total Crashes and a 79 percent decrease in Target Crashes. Further investigation shows there was a 70 percent decrease in the Total Severity Index and a 72 percent decrease in the Target Severity Index. The before period ADT year was 2000 and the after period ADT year was 2004.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 50 percent decrease in Total Crashes and a 79 percent decrease in Target Crashes. The summary results above demonstrate that the Treatment Location appears to have had a decrease in the number of Total and Target Crashes from the before to the after period using naïve methodologies.

The treatment location also experienced a considerable decrease in crash severity. The Severity Index for Total Crashes and Target Crashes at the treatment intersection decreased by 70 percent and 72 percent, respectively. In the before period, Target Crashes resulted in one Class-A injury crash, five Class-B injury crashes, six class-C injury crashes, and two PDO crashes. In the after period, Target Crashes resulted in one class-C injury crash and two PDO crashes. Total Injury Crashes decreased by 92 percent from the before to the after period.

A majority of crashes at the treatment location occurred on Fridays and Saturdays in both the before and after periods. In the before period, 46 percent (11 of 24) of the Total Crashes occurred on a Friday or Saturday. In the after period, 58 percent (7 of 12) of the Total Crashes occurred on a Friday or Saturday. This suggests that many crashes occur when the road users are people travelling for the weekend between the southern New Hanover County beaches and Wilmington.

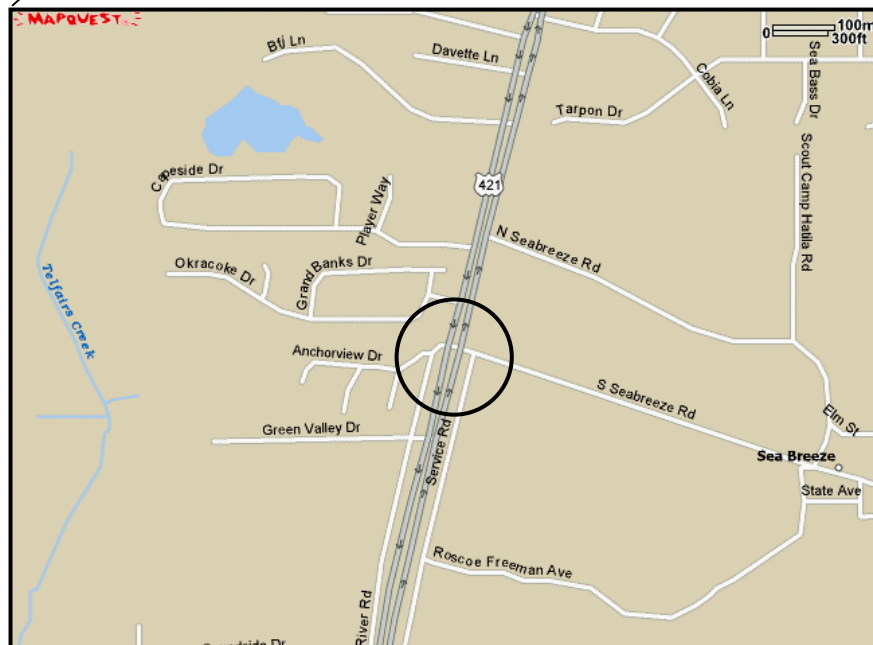
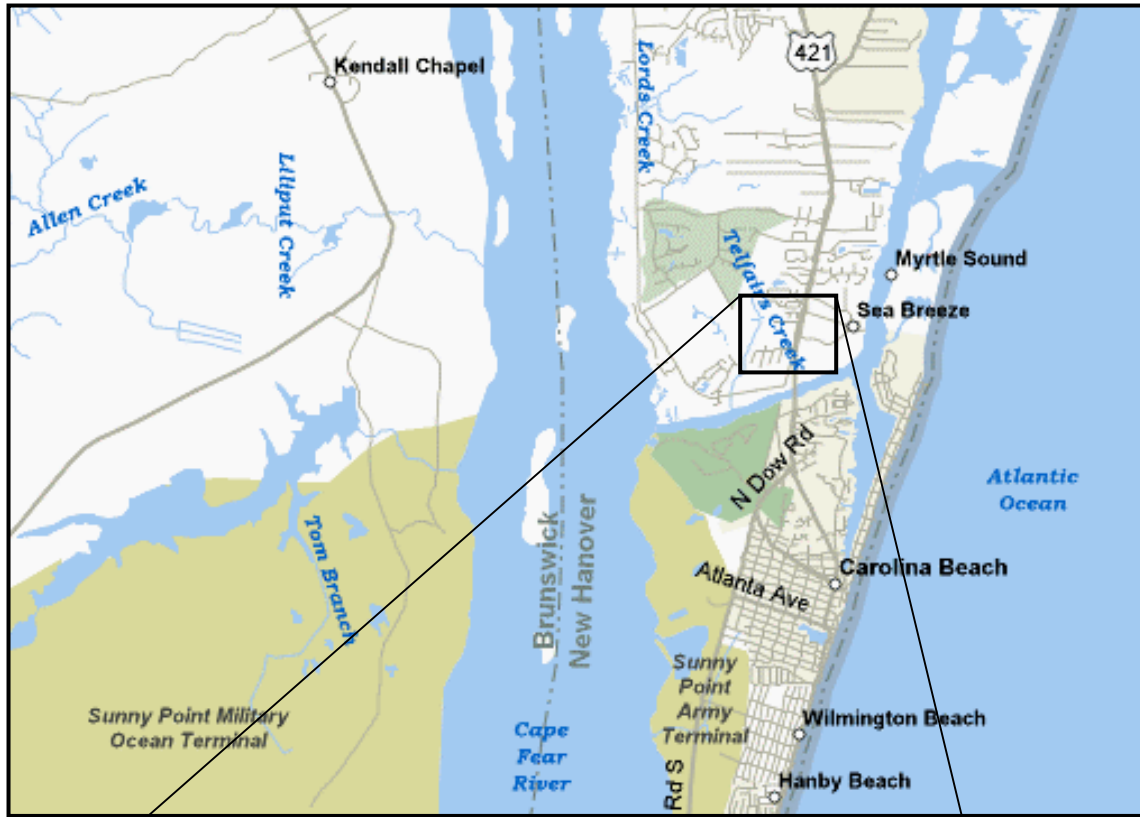
The speed limit on US 421 surrounding the treatment intersection was reduced from 55 mph to 45 mph in April 2002. The speed limit reduction occurs approximately 500 feet north of the treatment intersection and extends approximately $\frac{3}{4}$ mile south. Note that the speed limit reduction was not in conjunction with the spot safety improvement but it may have influenced the reduction of crashes in the after period.

Please see the attached Treatment Site Photos. The photos were taken from each leg of the treatment location. Also included is a photo looking southbound from the old left turn alignment and a photo looking southbound from the new offset left turn alignment. As you can see from the photos, offsetting the left-turn lanes has created much clearer sight lines and eliminated the sight restrictions created when left turning motorists were queued in the opposing left turn lane.

Also notice (as shown in several photos) that during the field investigation vehicles from the side streets were pulling into the median on US 421 and waiting to finish their turning movement. While these vehicles were queued in the median the sight lines for any left turn movements from the mainline were blocked. Although vehicles being queued in the median attributed to one sideswipe crash in the after period, it is uncertain whether this had an affect on any of the Target after period crashes.

As the Safety Evaluation Group completes additional reviews for this type of countermeasure, we will be able to provide more objective and definite information regarding actual crash reduction factors.

Location Map



Treatment Location Photos (Taken on June 26, 2006)



Both photos taken while looking north on US 421.

In the top photo, notice the vehicle that pulled into the median from River Rd and blocked the vehicle attempting to turn left from northbound US 421.

Treatment Location Photos (Taken on June 26, 2006)



All photos above taken while looking south on US 421.

In the top photo, notice the "Reduce Speed Ahead" sign. Currently the speed limit is reduced from 55 mph to 45 mph at approximately 500 feet north of the intersection. In the bottom photo, notice the vehicle that pulled into the median from River Road, blocking left turning vehicles.

Treatment Location Photos (Taken on June 26, 2006)



Looking south from the OLD Left Turn Lane on US 421.



Looking south from the NEW Left Turn Lane on US 421.

Treatment Location Photos (Taken on June 26, 2006)



Photo taken while looking east on SR 1576 (River Rd).



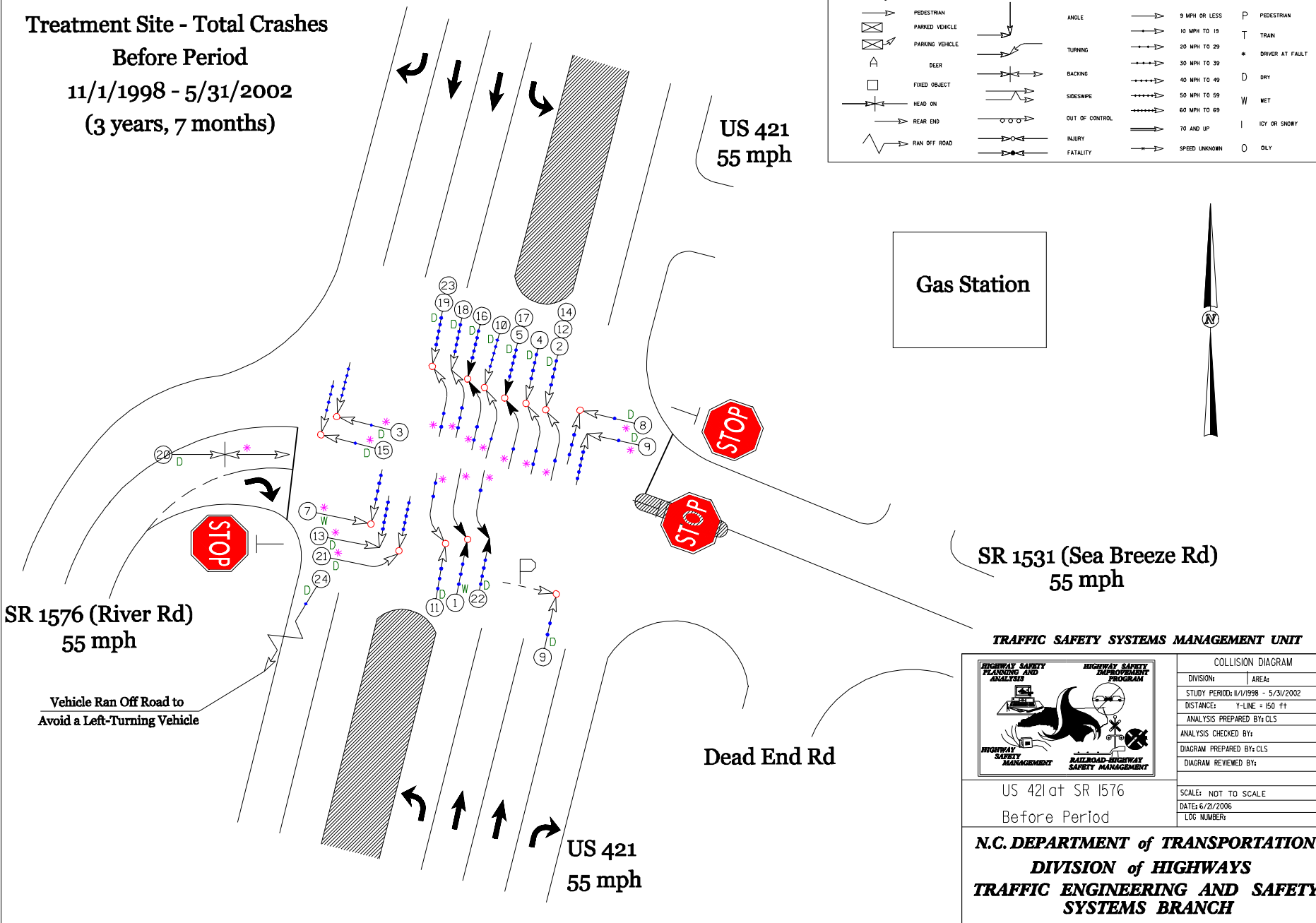
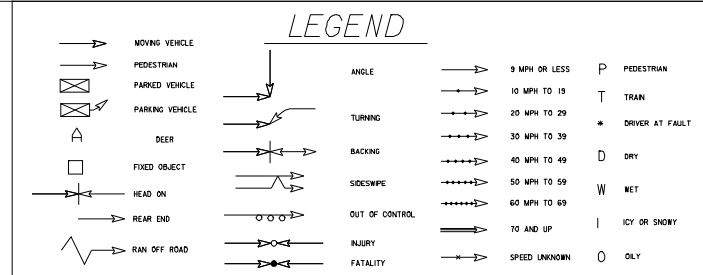
Photo taken while looking west on SR 1531 (Sea Breeze Rd).

Treatment Site - Total Crashes

Before Period

11/1/1998 - 5/31/2002

(3 years, 7 months)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 11/1/1998 - 5/31/2002	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLS	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLS	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 6/21/2006	
LOG NUMBER:	

US 421 at SR 1576
Before Period

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH

(3 years, 7 months)

US 421
45 mph

Gas Station

55 mph

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM

DIVISION: AREA:

STUDY PERIOD: 10/1/2002 - 4/30/2003

DISTANCE: Y-LINE = 150 ft

ANALYSIS PREPARED BY: CL

ANALYSIS CHECKED BY:

DIAGRAM PREPARED BY: CLM

DIAGRAM PREPARED BY: CLS

DIAGRAM REVIEWED BY: _____

US 421 at SR 1576

After Period

SCALE: NOT TO SCALE

DATE: 6/21/200

LOG NUMBER:

**TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH**

